mention one only. From my personal experience I am utterly unable to discover any distinction at the time of perception between a visual image in waking life and one in a vivid dream. It may be that afterwards I recognise that the latter were only baseless visions, but not, as a rule, from any quality or deficiency in the visual percept itself. I am aware that it has been suggested that even in dream images the retina is in some obscure way concerned, but this assumption seems to me quite gratuitous; it is not, so far as I know, supported by any evidence, and ought to be cut off by the razor of Occam.

EDWARD T. DIXON.

The Hard, Hythe, Southampton, December 5.

The Coloration of Birds' Eggs.

WITHOUT wishing to trespass further than I can help upon the space at disposal for discussing this topic, I may just explain that in my reply to Mr. Leslie, June 11, 1908, I distinctly gave it as my opinion that coloration had no connection with Mendelian principles. I concluded that coloration often depended on habitat, and was now useful as a means of protection; but the habitats (and nesting sites) of birds *change*, hence the anomalies met with which are cited as difficulties.

As to the colour-changes of the chameleon, Mr. Leslie ought to remember that this is an act of the animal itself, and a distinctly psychic act, in no way connected with reproduction. The coloration of the bird's egg is primarily the application of a pigment—depending in intensity on health and age—by the bird upon a *product* which has already ceased to form an integral part of the animal before the pigment is applied; and the bird's egg is not—like the mollusc's shell—an organic complement of the animal producing it. One might as well try to trace the evolution of a bird from the track of its foot in the sand as from the coloration of its egg!

So the parallel is inadmissible for this simple reason alone, apart from many others. Moreover, if number, form, size, texture in the shell itself have some morphological significance in relation to the bird's oviduct and secretory sacs, being also determined earlier in the phylogeny (as in the individual's ontogeny) of the group, coloration has little, except upon the selection and store of pigment; and the saurian and early avian eggs, furthermore, were uncoloured.

Thus coloration is a recent acquisition, which, as I have already pointed out, is intimately related—just as eggs and classification are, to some extent—to *habitat*, allied species (even genera or groups) laying allied types of eggs, adopting the same mode of life and nesting site. Thus it is a *physiological* adaptation, and as such cannot explain morphological origins, though as cause and effect we may compare coloration and protection from enemies, &c. In a word, coloration exists for concealment, and markings (*e.g.* the black blotch on the cuckoo's egg) for identification.

A. R. HORWOOD.

Leicester Corporation Museum, December 20.

THE CAPTURE AND TRAINING OF WILD ANIMALS.[1]

THE name of Carl Hagenbeck has attained such world-wide celebrity that a volume from the pen of the great animal-dealer and animal-tamer must surely receive a hearty welcome from the reading public. The publishers have therefore been well advised in bringing out an English edition of the original German work, although they might have taken care that it bore on the title-page some indication of its being from the pen of Mr. Hagenbeck himself. Whether the title is an exact translation of the German one we are unable to say, but if it be so, a slight modification would have been advisable, as it certainly does not read well in English. Neither, in spite of Dr. Mitchell's testimony as to the accuracy of their rendering, can we congratulate the translators on their style. "The menagerie owner Malforteiner" (p. 226) is not, for instance, elegant English; while a sentence on p. 153 conveys the astounding statement that Mr. Hagenbeck walked off with the fore-leg of a live elephant. On p. 157, as in many other places, we find "which" repeated in the first half of a very short sentence; and on p. 168 we find it stated that "this species is often captured, but in captivity they are very liable to die." On p. 58 the word "lime," in place of "bird-lime," completely spoils a sentence.

Mr. Hagenbeck commences his narrative with an account of his early life, in the course of which he tells his readers how he was initiated into the business of buying and exhibiting animals by his father, who took it up as a kind of supplement to his own proper trade late in life. When he once felt his feet, the author of the present volume forthwith proceeded to organise the trade of wild-beast catching on thoroughly business lines; and as he is the only man that has done so, the consequence is that he has practically monopolised the whole trade. Although it at times undoubtedly yields large profits, and is always full of interest to a man of enterprise and resource, the trade is full of risk, and demands great stability of character and perseverance in the face of losses on the part of those by whom it is conducted. We hear, for instance, of a loss of 10,000*l*. owing to disease seizing a collection of animals at the Crystal Palace for which that sum had been offered; while a sum of 5000*l*. was lost in two unsuccessful expeditions dispatched to Central Asia for the purpose of capturing argali sheep. The sheep were, indeed, captured right enough, but all died on the way home.

Young Walruses at Stellingen. From Hagenbeck's "Beasts and Men."

One of Mr. Hagenbeck's periods of great prosperity took place in the middle 'sixties and up to 1876, when an enormous number of live animals was brought out of the Egyptian Sudan. The menageries of the world were, however, overstocked, and about the year 1877 the author had almost to give away giraffes: this state of affairs induced him to take up the exhibition and training of animals in an establishment of his own—a branch of his business which culminated in the inauguration of the present animal-park at Stellingen. One of his earliest experiments in this direction was

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[1] "Beasts and Men, being Carl Hagenbeck's Experiences for Half a Century among Wild Animals." An abridged translation by H. S. R. Elliot and A. G. Thacker, with an introduction by P. Chalmers Mitchell. Pp. xiii+299; illustrated. (London: Longmans, Green and Co., 1909.) Price 12*s*. 6*d*. net.

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the exhibition of a herd of reindeer in charge of a party of Lapps, an exhibition which led to the importation of parties of natives from many other parts of the world.

Either personally or by means of his representatives, Mr. Hagenbeck has explored a very large portion of the globe, having brought home, and reared, walruses from Greenland, giraffes, elephants, and rhinoceroses from the heart of Africa, tigers and sambar from the jungles of India, and wild horses and onagers from the fringe of the Gobi desert. The most interesting chapters in the book are undoubtedly those in which the author describes the various methods of capturing wild animals alive, and the behaviour and habits of particular species and groups. Did space permit, we might refer to many stories of adventures and escapes, but we must be content with mentioning one case where a party of some 3000 baboons attacked and beat off the captors of their fellows. These baboons, like many carnivora, are captured as adults by means of traps; but in the case of the larger herbivores Mr. Hagenbeck's most successful method is to train the natives (if they require it) to ride in pursuit of the herds until the young ones are brought to a standstill.

The book, which deserves a fuller notice than can be given here, is rich in interest from beginning to end; and should be of considerable value to all the custodians of zoological gardens. R. L.

THE SEXTO-DECIMAL YEAR OF BRITISH CALENDARS.

IN searching English and Welsh calendars for sequences of festivals at intervals corresponding with the sun's stations on quarter and half-quarter days, or, in other words, the quarter days of both the solstitial and the May years—the octave year consisting of eight half-quarters—I find another octave year definitely marked in the calendars, and to a large extent still observed by festivals and fairs. The year of British calendars is definitely sexto-decimal, both the solstitial and May quarter days being duplicated, with the striking result that the eight half-half-quarter days coincide within three days of the exact half-half-quarter stations of the sun, the unit interval being roughly three weeks. The interval between a solstitial and a May quarter day being roughly six weeks, the duplicate octave year may be called an intermediate year.

The intermediate year is evidently the oldest octave of the two. It is the year as observed previously to the publication of the Julian calendar. Its basis was a calendar which was not corrected for the precession of the equinoxes, but which in other respects has been kept up to date. Calendars of other countries present similar anachronisms, but the persistence in Britain of such a belated calendar calls for special notice.

The jumbling together of two festival reckonings, on bases two thousand years apart, has resulted in a strikingly symmetrical sexto-decimal year. The festivals of the older octave were accurately fixed on solar quarter and half-quarter days, a fact which implies either the continued use of astronomical monuments for solar or stellar observation on those days, or a computation based on the exact length of the year. Within the Christian era, the festivals of the older reckoning drifted out of correspondence with the original solar stations. When the dates of the older sequence of festivals were marked in the Julian calendar, it was found—and I think it is hardly possible that the fact could have been overlooked—that the dates were just midway between the solar stations of a Julian sequence of festivals, and it became possible to utilise the half-half-quarter stations of the sun to indicate the incidence of the belated festivals. What makes the subject still more interesting is the discovery by Sir Norman Lockyer and others of indications of similar half-time dates in monument measures (NATURE, November 12, 1908, p. 36).

A complete sexto-decimal solar year may be expressed as follows, the nearest round number of minutes of declination being given :—

Sun's decl.		Dates
N. 23° 30′ E.	... ...	June 22
,, 21 30 ,,	... ...	May 29–30, July 16
,, 16 20 ,,	... ...	May 6, August 8
,, 8 30 ,,	... ...	April 12–13, September 1–2
East	... ...	March 21, September 23
S. 8° 30′ E.	... ...	February 27–28, October 15–16
,, 16 20 ,,	... ...	November 8, February 4
,, 21 30 ,,	... ...	November 30, January 13–14
,, 23 30 ,,	... ...	December 23

Half-quarters of the Older Octave.

Date	Dedication	Character of Festival
November 30	Andrew	All Hallows
January 13...	Hilary	Winter solstice
February 28	Oswald	Candlemas
March 1 ...	David	
April 15 ...	Oswald	Vernal equinox
June 1... ...	Tekla	May day
July 15 ...	Swithin	Summer solstice
,, 17 ...	Kenelm	
September 1	Giles	Lammas
October 15...	Ulfrann	Autumnal equinox
,, 17...	Etheldreda	
,, 18...	Luke	

When the older octave only was marked in a calendar, such a calendar was doubtless a lunar one, and sometimes the interval between two festivals exactly corresponds with the solar interval only in a lunar reckoning. For instance, January 13–April 13 represents in the Roman lunar calendar the exact interval between the winter solstice and the vernal equinox, both dates being also Ides.

The intermediate year is clearly a May one, the first quarter, November–February, being rounded by the patron saints of Scotland and Wales. There is abundant evidence of St. Andrew's having been observed as New Year's Day. The interval between St. David's Day and St. Andrew's corresponds to the length of the vegetation year pure and simple. I think St. Patrick's Day, March 17, represents, like St. David's, a Candlemas festival, by a lunar calculation like that of the Coligny calendar. That date about the ninth century coincided with the vernal equinox, when it seems to have been given an equinoctial significance in connection with the commemoration of St. Patrick; but the shamrock, like the date, is reminiscent of a Candlemas festival (NATURE, July 25, 1907, p. 295).

In one parish in Glamorgan—namely, Llangeinor—the complete sexto-decimal year was, until recently, observed by holding a court every three weeks. The patronal day is October 8, three weeks before All Hallows, but originally an autumnal equinox festival.

There is much evidence to show that the Scandinavian and German invaders of England, on the one hand, and the Welsh-speaking invaders of Wales from the north in post-Roman times, are chiefly responsible for fixing permanently the intermediate year in our calendar. So much is indicated by the list of saints commemorated, but more particularly by the association in Wales of half-half-quarter fairs with traces of northern and Scandinavian settlements

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